GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: ENVS 1 DIVISION: 10 ALSO LISTED AS:

TERM EFFECTIVE: Spring 2021 CURRICULUM APPROVAL DATE: 12/8/2020

SHORT TITLE: INTRO ENVIRONMENTAL SCIENCE

LONG TITLE: Introduction to Environmental Science

Units	Number of Weeks	Type	Contact Hours/Week	Total Contact Hours
4	18	Lecture:	3	54
		Lab:	3	54
		Other:	0	0
		Total:	6	108

Out of Class Hrs:	108.00
Total Learning Hrs:	216.00

COURSE DESCRIPTION:

An introduction to the scientific principles and problem solving techniques used to evaluate the effects of human activities on different ecosystems. Topics will include the sustainability and stewardship of various ecosystems, environmental hazards such as air and water pollution, waste disposal, pesticides and herbicides, the impact of commercial and industrial activities, as well as population and urbanization. Basic chemistry, physics, and geology will be used throughout the course to explain and expand on these topics. The concepts will be reinforced with an integrated service learning laboratory program. This course was previously listed as ES 1.

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion
03 - Lecture/Laboratory
04 - Laboratory/Studio/Activity
04B - Laboratory - LEH 0.75
05 - Hybrid
71 - Dist. Ed Internet Simultaneous
72 - Dist. Ed Internet Delayed
73 - Dist. Ed Internet Delayed LAB
73B - Dist. Ed Internet LAB-LEH 0.75

STUDENT LEARNING OUTCOMES:

By the end of this course, a student should:

1. Use the scientific method to investigate and evaluate local, national and global environmental issues.
2. Explain how matter and energy changes as they cycle through ecosystems.
3. Explain the role of evolution, biodiversity and population dynamics in ecosystems.
4. Critically evaluate renewable and nonrenewable energy resources.
5. Use modern laboratory techniques and equipment to identify pollutants and use quantitative analysis to evaluate the effects on the environment.
6. Apply objective problem-solving techniques to evaluate various environmental issues as they relate to politics, society, the legal system, economics at the local, national and global level.

COURSE CONTENT:

Curriculum Approval Date: 12/8/2020

LECTURE CONTENT:

3 HOURS - INTRODUCTION TO ENVIRONMENTAL SCIENCE

A. Scientific methodologies: How science works

B. Role of science in solving environmental problems

C. Finding, interpreting, and evaluating scientific information

D. History of environmentalism

E. Environmental ethics and economics: our values and choices

F. Environmental sustainability

Student Performance Objectives (SPO):

1. Be able to describe what Environmental Science is and how the scientific method can help people understand the world.

2. Be able to discuss why it is important to know how humans interact with the environment.

3. Describe the role of ethics in environmental decision making.

4. Describe the anthropocentric, biocentric, and ecocentric ethical worldviews.

5. Discuss how environment and the economy are intricately linked.

3 HOURS - ECOLOGICAL PRINCIPLES

A. Physical Environment

B. From Chemistry and Energy to Life

C. Environmental systems: connections, cycles and feedback loops

D. Energy flow through ecosystems

1) Energy forms and the laws of thermodynamics

2) Food chains, food webs, and ecological pyramids

3) Bioaccumulation and biomagnifications of contaminants

Student Performance Objectives (SPO):

1. Describe the fundamental building blocks of matter.

2. Discuss the characteristics, sources, and uses of various forms of energy for living organisms.

3. Describe the various types of ecosystems/biomes.

4. Describe the principles of ecological pyramids.

3 HOURS - ECOLOGICAL PRINCIPLES continued

A. Cycling of matter within ecosystems

1) Conservation of mass

2) Biogeochemical cycles

3) Ecosystems/Biomes

Student Performance Objectives (SPO):

1. Define a system.

2. Describe major characteristics of various biomes and ecosystems.

3. Describe the major biogeochemical cycles and the human impacts on these cycles.

3 HOURS - ECOLOGICAL PRINCIPLES continued

A. Populations: species, evolution, population ecology, human demographics

B. Biological communities: species interactions, ecological niche, succession

Student Performance Objectives (SPO):

1. Discuss the relationship between evolution of species and biodiversity.

2. Describe the theory of evolution by natural selection.

3. Describe the major characteristics of population.

4. Discuss the important interactions between species that occur within communities.

COURSE CONTENT(CONTINUED):
LECTURE CONTENT(CONTINUED):
3 HOURS - BIODIVERSITY, PRESERVATION, CONSERVATION
A. Definition and importance of biodiversity
B. Endangered and threatened species
C. Invasive species and other threats to biodiversity
D. Legislation: Endangered Species Act
E. Social, economic, and/or cultural impacts/considerations
Student Performance Objectives (SPO):
1. Discuss the various types of biodiversity.
2. Explain species extinction and causes of biodiversity loss.
3 HOURS - POPULATION AND GROWTH
Student Performance Objectives (SPO):
1. Describe how population growth affects the environment.
2. Discuss why wealthy countries, with lower growth rates can have a huge environmental impact.
3. Discuss the concept of urbanization and why public lands are needed.
4. Discuss the issues and alternatives involved in modern forest management.
5. Discuss the tools for planning sustainable cities and urban areas.
3 HOURS - AGRICULTURE, BIOTECHNOLOGY, AND THE FUTURE OF FOOD
Student Performance Objectives (SPO):
1. Discuss the current status of agriculture production.
2. Describe role of pest management in agriculture.
3. Discuss pros and cons of transgenic crop.
4. Discuss various methods of preserving genetic diversity of agricultural products.
5. Describe the environmental impacts of modern animal production methods.
6. Discuss the characteristics and environmental benefits of sustainable agriculture.
3 HOURS - WATER
A. Water as a resource
1) Properties and importance
2) Hydrologic cycle and human impacts
3) Resource issues: flooding, drought, groundwater depletion, salinization, wetland loss
4) Water conservation and management strategies
5) California water resources and use
6) Personal water use
Student Performance Objectives (SPO):
1. Describe the Hydrological cycle and human impact on water resources.
2. Describe the importance of water its properties and characteristics.
3. Compare and contrast the structure and function of marine and freshwater ecosystems.
4. Examine strategies for solving freshwater depletion problems.

COURSE CONTENT(CONTINUED):

LECTURE CONTENT(CONTINUED):

3 HOURS - WATER continued

A. Water Pollution

1) Types, sources, and effects of water pollution

2) Improving water quality

3) Wastewater and drinking water treatment

B. Legislation: e.g. Safe Drinking Water Act, Clean Water Act

C. Social, economic, and/or cultural impacts/considerations

Student Performance Objectives (SPO):

1. Describe the types and the effects of water pollution.

2. Investigate water quality local, state, national and other countries.

3. Describe the Clean Water Act and how it protects our waters.

3 HOURS - AIR

A. Air as a resource: properties and importance

B. Air pollution: types, sources, effects, solutions

C. Regional and global atmospheric changes: causes, effects, solutions

1) Global climate change

2) Ozone depletion

3) Acid deposition

D. Legislation: e.g. Clean Air Act, Kyoto Protocol, Montreal Protocol

E. Social, economic, and/or cultural impacts/considerations

Student Performance Objectives (SPO):

1. Be able to list the various types of pollutants in the air and their effects on the environment.

2. Compare and contrast the different types of greenhouse gases, how they operate and their effects on the environment.

3. Discuss current conclusions made by atmospheric scientist about global climate change.

4. Describe some causes of the debate surrounding climate change.

5. Describe the Clean Air Act and the Kyoto protocol.

3 HOURS - ENERGY

A. Units for energy and power

B. Fossil fuels: types, origin, availability, pros and cons, new technologies

C. Nuclear energy: types, pros and cons, safety, radioactive waste

Student Performance Objectives (SPO):

1. Define energy.

2. Describe energy usage for developed and developing countries.

3. Describe the development of non-renewable energy and renewable energy.

4. Describe renewable energy sources.

5. Describe how nuclear reactors work.

6. Describe the environmental impact using fossil fuels, natural gas and nuclear energy.

COURSE CONTENT(CONTINUED):

LECTURE CONTENT(CONTINUED):

3 HOURS - ENERGY continued

A. Renewable energy: types, pros and cons, new technologies

B. Conservation and efficiency

C. Energy strategies: national, local, personal

D. Social, economic, and/or cultural impacts/considerations

E. Renewable and Nonrenewable energy sources

Student Performance Objectives (SPO):

1. Compare and contrast the sources of renewable and nonrenewable energy used by developing and developed countries.

2. Discuss the advantages and disadvantages of wind, geothermal, hydrogen fuel and nuclear energy usage.

3. Discuss the environmental impacts of using fossil fuels and other alternatives.

5 HOURS - SOLID AND HAZARDOUS WASTE

A. Solid waste: types, sources, disposal methods, environmental impacts

B. Hazardous waste: types, sources, disposal methods, environmental impacts

C. Waste prevention: reduction, reuse, recycling

D. Legislation: e.g. Resource Conservation and Recovery Act, Superfund Act

E. Social, economic, and/or cultural impacts/considerations

Student Performance Objectives (SPO):

1. Discuss the various categories of waste.

2. Describe new methods, such as composting and recycling.

5 HOURS - OUR FUTURE WORLD: CREATING SUSTAINABLE COMMUNITIES

A. Feeding our communities: Sustainable agriculture

B. Where do we live and work: Urbanization trends and creating sustainable cities

1) Land-use planning, sustainable development

2) Urban Forestry

3) Green-building

Student Performance Objectives (SPO):

1. Describe the concept of sustainable development.

2. Describe the difference between growth and progress and methods to achieve sustainable progress.

3 HOURS - ENVIRONMENTAL POLICY

A. Decision making and problem solving

Student Performance Objectives (SPO):

1. Discuss goals of environmental policy.

2. Describe the legislative, executive and judicial branches of the U.S. Government and how they influence environmental policies.

3. Identify the major steps of environmental policy making process.

4. Describe the various state, federal and international organizations that are involved in environmental affairs.

COURSE CONTENT(CONTINUED):
LECTURE CONTENT(CONTINUED):
3 HOURS - ENVIRONMENTAL EDUCATION
A. What then shall we do?
B. What are the benefits, cost and limits of Green business and technology?
Student Performance Objectives (SPO):
1. Summarize environmental education.
2. Describe environmental literacy and how it helps us understanding our environment.
3. Evaluate practical changes that individuals can do to better conditions.
4. Define 'environmental leader'.
2 HOURS - FINAL EXAM

LAB CONTENT:
3 HOURS
Introduction of Lab Format and Scientific Methods.
Introduce and review scientific literature and research methods.
Introduce Service Learning and select primary research project.
3 HOURS
Lab: Chemistry of Life, Molecule to Cell, Cell to Organism, Community Structure
3 HOURS
Lab: Biogeochemical cycles, Ecosystems/Biomes, ID local biomes
3 HOURS
Lab: Diversity I - Protista, Fungi, and Plant
Ecological succession habitat survey
Organism to population (species)
Population to Community
3 HOURS
Lab: Diversity II - Animal and Coevolution
Habitat and Niche
Ecological Competition
Lifestyle Choices and effects on biodiversity
3 HOURS
Lab: Estimating Population Size - quadrat sampling methods- plants and animals
Human Population Dynamics
Assessment of a Land-Use Planning report
3 HOURS
Lab: Biotech - Genetically Modified Organisms
Guest Speaker: Biotech/Agriculture industry
3 HOURS
Lab: Stream Ecology Stream Quality Assessment using survey of animal/plant life and physical assessment:
a. Total Dissolved Solids
b. pH
c. Biochemical Oxygen Demand
d. Fecal Coliform
a. Total phosphate
b. Total Nitrate
c. Ammonium Nitrogen

COURSE CONTENT(CONTINUED):
LAB CONTENT(CONTINUED):
3 HOURS
Lab: Field trip - Water Treatment Plant
3 HOURS
Lab: Air Pollution - Natural sources, human sources, reduction efforts and legislation
Guest speaker: EPA and Air Quality Assessment
3 HOURS
Lab: Economics of Energy Consumption
Renewable Energy
Personal Energy Consumption
Environmental Awareness and Lifestyle
3 HOURS
Lab: Field trip - Power plant Calpine Gilroy Cogeneration/Moss Landing Power plant
6 HOURS
Lab: Our Finite Resources
Service Learning activity - Recycling and Waste management
6 HOURS
Lab: Service Learning activity - Restoration/Conservation efforts
Process of Land use planning Assessment of an Environmental Impact Report and mitigation
Guest speaker - Environmental planner
3 HOURS
Lab: Campus Environmental Audit - biodiversity survey, energy usage, water usage
3 HOURS
Lab: Service Learning Project Activity and Report

METHODS OF INSTRUCTION:

Lecture and visual aids Discussion of assigned reading Discussion and problem solving performed in class Quiz and examination review performed in class Homework and extended projects Field observation and field trips Guest speakers Collaborative projects

OUT OF CLASS ASSIGNMENTS:

Required Outside Hours: 30

Assignment Description:

Within the semester assignment from text/open resources/Gavilan library resources will be used. The assignments will address environmental concerns we face today such as - How to achieve sustainability, which would allow humans to survive within Earth limits. Describe the contributions to the principles of environmental science by immigrants and indigenous people. Highlight contributions made by Charles Darwin, Alfred Wallace, Thomas Malthus, Garrett Hardin, Rachel Carson, John Muir, Gifford Pinchot and Aldo Leopold and contemporary individuals.

Required Outside Hours: 6

Assignment Description:

Use text and Gavilan library resources to describe the three phases of U.S. Environmental policy and some major environmental laws that were passed during each phase. What impact did the publication of 'Silent Spring' have in 1962’

Required Outside Hours: 72

Assignment Description:

Homework, lab reports, other written assignments

METHODS OF EVALUATION:

Writing assignments

Percent of total grade: 10.00 %

Percent range of total grade: 10 % to 20 % Written Homework; Lab Reports; Essay Exams; Term or Other Papers

Problem-solving assignments

Percent of total grade: 10.00 %

Homework Problems; Field Work; Lab Reports; Quizzes; Exams; Other: service learning

Skill demonstrations

Percent of total grade: 40.00 %

Percent range of total grade: 30 % to 40 % Class Performance/s; Field Work

Objective examinations

Percent of total grade: 40.00 %

Percent range of total grade: 30 % to 40 % Multiple Choice; True/False; Matching Items; Completion; Other: Essay

REPRESENTATIVE TEXTBOOKS:

Daniel J. Sherman and David R. Montgomery. Environmental Science and Sustainability. Norton,2020.
Faculty have the option of adopting either textbook for their course.
ISBN: 978-0-393-42211-5
Reading Level of Text, Grade: 14 Verified by: Publisher

Jennifer Kurushima, Timothy Thomas. Environmental Science Lab Manual. 2020.
Lab handouts created by Gavilan faculty
ISBN: n/a
Reading Level of Text, Grade: 12 Verified by: Word

Recommended Representative Textbooks

Cunningham/Cunningham. Environmental Science: A Global Concern 12th ed. McGraw Hill,
ISBN: ISBN: 978-0-07-338325-5
Reading Level of Text, Grade: Reading level of text, Grade: 14 Verified by: Verified by:DYoung
Travis P. Wagner, Robert Sanford. Environmental Science: Active Learning Laboratories and Applied Problem Sets. Wiley,2018.

Lab Manual
ISBN: 978-1119465744
Reading Level of Text, Grade: 12 Verified by: Word

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:
- GAV B2, effective 202550
- GAV B3, effective 202550
- GAV F, effective 202550
- GAV Area 5 = Natural Sci, effective 202550

CSU GE:
- CSU B2, effective 202550
- CSU B3, effective 202550

IGETC:
- IGETC 5B, effective 202550
- IGETC 5C, effective 202550

CSU TRANSFER:
- Transferable CSU, effective 202550
- Not Transferable

UC TRANSFER:
- Transferable UC, effective 202550
- Not Transferable

SUPPLEMENTAL DATA:

Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education:
Program Status: 2 Stand-alone
Special Class Status: N
CAN:
CAN Sequence:
CSU Crosswalk Course Department:
CSU Crosswalk Course Number:
Prior to College Level: Y
Non Credit Enhanced Funding: N
Funding Agency Code: Y
In-Service: N
Occupational Course: E
Maximum Hours:
Minimum Hours:
Course Control Number: CCC000554968
Sports/Physical Education Course: N
Taxonomy of Program: 030100